

may provide a means of testing the theory by molecular biological analysis, he said. 'The peculiarities of these Bacteria that we discovered strongly suggest that they may be of great value for tracing early biochemical evolution on the Earth,' he added.

Dr Gest and his assistant, Jeffrey L. Favinger, were about to throw out the contents of a flask—from an undergraduate's classroom experiment on photosynthetic Bacteria that had failed because of an error in preparation—when they noticed something growing near the bottom of the flask. They isolated the organism, which had been present in soil dug up by the student in front of the biology building, and realized they had discovered 'something different'. They named the new organism *Heliobacterium chlorum*, which translates from the Greek as something like 'sun green Bacterium'.

All green plants must have nitrogen in order to grow. Though there is plenty of nitrogen gas in the air, most plants are unable to use it and must obtain combined nitrogen from other sources, such as nitrogen-rich compounds in the soil. This is the principal reason why most crop plants need to be fertilized. But because virtually all photosynthetic Bacteria are also able to take nitrogen gas from the air and use it for growth, these Bacteria are prominent among biological systems that are being investigated by scientists supported by the NSF as part of a fundamental effort to determine how green plants might make their own fertilizer by taking nitrogen from the air.

Gest & Favinger found that *Heliobacterium* has some odd characteristics. 'This Bacterium is extraordinarily sensitive to gaseous oxygen. Even minute traces of oxygen completely inhibit its growth,' Dr Gest said. 'In addition, the Bacterium contains a unique form of chlorophyll, the green light-capturing pigment. A chlorophyll molecule essentially consists of four rings of atoms that are fused together, with a magnesium atom at the centre of the structure. One of the rings has a side-branch of two linked carbon atoms. In all other known photosynthetic Bacteria, this side-branch also contains one oxygen atom. But there is no oxygen atom in the side-branch of the chlorophyll in the Bacterium we discovered.'

'This absence of oxygen, together with the fact that even minute traces of oxygen prevent growth of this Bacterium, reinforces the idea that the Bacterium evolved long before there was any oxygen gas in the Earth's atmosphere—in other words, long before photosynthesis by green plants was "invented",' Dr Gest explained.

The research workers are sending batches of the Bacterium to scientists at other institutions who specialize in different areas of biochemistry and molecular biology. 'This will speed up solution of the life-style mysteries of this fascinating organism, whose ancestors were at an important crossroad in evolutionary history,' Dr Gest said.

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Gasifiers—a Born-again Technology

There is no irony in the technological lead of the Philippines and Brazil in developing gasifiers; for during World War II, when Europe's oil-starved economies were under military siege, 'gasification' powered more than one million vehicles. London buses could be seen towing stove-like gasifiers on trailers, while many big cars of the 1940s sprouted devices resembling boilers on their rear ends, and sported roof-racks full of charcoal.

Post-war supplies of cheap oil quickly killed gasification. After all, the gas is poisonous (mostly carbon monoxide), so dirty that engines need 'constant' cleaning, and not as 'hot' as gasoline—making gasified engines sluggish. Then, in the 1970s, rapidly-rising oil prices and falling commodity prices placed oil-importing Third World countries under economic, rather than military, siege. The capital cost of a gasifier system is about one US cent higher per kilowatt/hour than that of a diesel engine,

and maintenance and running costs are about three cents more. But fuel for the gasified diesel costs ten cents less per kWh. The total cost of power with gasification is about 30% less than with straight diesel.

Successes in the Philippines and Brazil have spurred aid agencies to take a hard look at gasifiers as a means of solving the energy crisis in developing countries. Wood gas cannot help all Third World countries: in particular, regions without trees—such as Sahelian Africa or the Middle East—lack the fuel to run gasifiers. But many development experts are convinced that wood gas is a commodity whose time has come around again.

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Oil-wells Blocked to Prevent War Damage

Iran has blocked all but six of its oil-wells in the offshore Nowruz and Ardeshir fields with cement, virtually eliminating the possibility that future Iraqi missile strikes in the area could result in increased oil pollution of the Gulf, according to reports reaching the World Wildlife Fund International. Seventy-five wells in the Nowruz field, and an unspecified number that includes all wells in the nearby Ardeshir field, have been blocked down to the seabed, according to industry sources. All these wells will eventually have to be re-drilled to be put back into production, these sources said. The last wells were blocked in November 1983.

The World Wildlife Fund and other conservation groups have been alarmed at the prospect of further damage to wells that might drastically increase oil pollution of the Gulf. Pollution has already virtually exterminated the population of dugongs and sea snakes,

and severely affected coral reefs, marine turtles, and other living things in coastal waters.

Wells on two platforms in the Nowruz field were still burning in November after being hit by Iraqi missiles in early March. At the former time there had been no recent missile strikes against oil-wells, but there have been continuing attacks on Iranian shipping, the oil terminal at Kharg Island, and onshore pumping and storage facilities. Offshore oil for these facilities was being produced only in the Fereidoon field, which had not been attacked. Meanwhile an international conference has been scheduled in Teheran to study the environmental effects in the Gulf of oil pollution caused by the war.

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